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Before the
Federal Communications Commission
Washington, D.C. 20554

In the matter of:	)	
	)	GN Dockets Nos.
IMPACT OF MIDDLE AND SECOND MILE	**)**	**09-47, 09-51 and 09-137**
ACCESS ON BROADBAND AVAILABILITY	**)**	
AND DEPLOYMENT	)	

Comments of Globecomm Systems Inc. on NBP Public Notice #11

Globecomm Systems Inc. (GLOBECOMM)[1] is pleased to provide comments in response to the Commission's Public Notice DA 09-2186, released October 8, 2009, respecting middle and second mile transport as part of end-to-end broadband delivery.

GLOBECOMM is a public company committed to being a leading provider of satellite and terrestrial communications infrastructure and services, integrated with Information Technology, to provide customers end-to-end IT/Telecom solutions. GLOBECOMM's goal is to constantly improve and develop expert engineering capabilities as the driving force behind its growth and technological maturation. GLOBECOMM strives to be a solution leader in the markets it pursues, maintaining the highest standards of quality and service for its customers and trust and integrity with GLOBECOMM's stakeholders. Thusly, GLOBECOMM views its heritage as technological discovery and innovative engineering.

GLOBECOMM is a global communications company delivering complete solutions for telecommunications, Internet, and broadcasting services. GLOBECOMM's customers turn to it

[1] GLOBECOMM, also known as GSI, but seeking to "brand" itself nationally and globally as GLOBECOMM, has filed Comments with the Commission in the consolidated dockets captioned above on October 23, 2009. Further, on June 8, 2009 it filed Comments with regard to the Commission's NOI as a step toward promulgation of a National Broadband Plan. GLOBECOMM also filed Comments in GN Docket No. 09-40 on April 13, 2009 regarding the Commission's consultative role under the Recovery Act.

because of its proven ability to reduce customers' time from project conception to cut-over to operations. As such; GLOBECOMM provides its customers a single, reliable source for engineering, system integration and installation and operational services -- GLOBECOMM can take total, end-to-end responsibility for making complex solutions work.

In these contexts GLOBECOMM seeks through its Comments to further the public record with regard to broadband middle mile and second mile technology in response to NBP Public Notice 11. In GLOBECOMM's case middle mile and second mile technology and costs are subsumed within its satellite transport, so a single satellite network providing broadband is in essence a highly reliable hybrid. Satellite transport for broadband service (and otherwise) is inherently distance-insensitive in terms of capabilities and costs. Thus, GLOBECOMM can initiate broadband services to any unserved or underserved area with immediacy and with established quality of service. Moreover, the satellite earth station infrastructure deployed is comprised of reusable components; if and when less costly (or alternative) terrestrial facilities become available, the satellite equipment can be reused, which is both evolutionarily and environmentally sound.

It is noteworthy that GLOBECOMM has heretofore sought to define for the Commission its universal broadband solution. To that end, GLOBECOMM's technology team drafted a technical whitepaper under which broadband and other communications services are supported from a hosted core network by combining satellite and wireless broadband network technologies, within a converged multi-standard core. The core network can support all wireless technologies for data, voice, video as well provide access to the Internet and to the Public Switched Network. GLOBECOMM's technical whitepaper was submitted as a matter of public record with its filing herein on October 23, 2009. Thus, GLOBECOMM demonstrated through its technical whitepaper the ability to address the problem of providing a rapidly deployable broadband

services solution to any unserved or underserved regions where limited or no broadband backhaul connectivity exists.

GLOBECOMM's technical whitepaper offers a universal broadband solution utilizing an existing satellite distribution network, demonstrating how broadband services can be made available anywhere in the United States within a short timeframe, on a shared-spectrum basis that is affordable.[2] And, insofar as specific regions of the United States may have alternate technologies available, these can be used without any appreciable design change or impact as depicted in its whitepaper. These would be incorporated into the core network. Thus, GLOBECOMM will employ the best available technologies. This is both feasible and desirable because GLOBECOMM's solution is based on IP; so, <u>any</u> transport technology that supports IP can be used whenever available.[3]

GLOBECOMM has built and operates multi-service IP systems domestically and internationally, often under extreme conditions in rural and remote areas. Brief examples follow, with a "case study" description of each project attached hereto as appendices:

- **Alaska.** In conjunction with General Communications, Inc. (GCI) and other technology companies, GLOBECOMM is in the process of linking together over 250 operating nodes (some extremely remote and rural). Addressing, among other things, middle mile and second mile problems, the GCI network operates as whole, making new and advanced services available at locations that were hostile in terms of climate and weather. The network is a commercial success. (See Appendix 1)

- **SatCell®**. GLOBECOMM engineered and deployed an innovative IP-based solution to greatly increase the efficiency and utilization of the Abis Satellite, optimizing bandwidth and maintaining quality of service to the Arabian Peninsula. (See Appendix 2)

- **Afghanistan Communications.** GLOBECOMM built and helps maintain a government/public backbone, comprised of a combination of satellite, fiber,

[2] It is expected that satellite operating expenses will decline as next generation satellites are launched and are cut-over to service.

[3] Insofar as any cost differential for Internet backbone is concerned, these costs should be the same for terrestrial providers and satellite providers.

microwave and Wimax in Afghanistan. This was a turnkey project, where GLOBECOMM supplied the middle mile and the second mile solutions for IP, voice and data, as well as the core network. The network, built under very difficult conditions, is, nevertheless, successful. It offers its users first-time connectivity and international voice, video and Internet service. Among other things, GLOBECOMM connected a multitude of rural and remote hubs for police, fire and other essential services for Afghanistan's 337 legislative districts. (See Appendix 3)

- **TongaNet.** GLOBECOMM engineered, built and maintained via its Long Island Teleport, a 21st Century voice, data and entertainment service throughout the Kingdom of Tonga. The network integrates satellite, terrestrial microwave, GSM cellular, fixed wireless and DTV. This network provided Tongans "triple-play" well before this term was commonly used in telecommunications. High-speed internet access is provided to the government, businesses and other consumers.

In conclusion, Globecomm has developed, delivered and deployed innovative and cost effective solutions utilizing a hybrid IP network based on the integration of fiber, microwave, wireless and satellite technologies. Furthermore, GLOBECOMM has coupled these transport technologies with IP soft switch technology to provide on a cost effective basis multiple services, such as mobile telephony and broadband data to geographically diverse and low density subscriber communities. And, leveraging the large coverage area of the satellite footprints it is now possible to aggregate and manage such services covering large geographic areas via a single common telecommunications infrastructure. GLOBECOMM's solutions enable economies of scale for operators while creating jobs in underserved markets promoting Universal Service and the legislative initiatives of the American Recovery and Reinvestment Act of 2009.

Respectively Submitted,

/s/ Paul J. Johnson

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November 4, 2009

Appendix 1

CASE STUDY

Bringing Mobility to the Village

Globecomm Creates a Rural Wireless Network in Alaska for GCI

Since 1996, the telephone bills paid by Americans have contained a surcharge labeled "Universal Service Fund" (USF). The money subsidizes communications services for geographically remote and low-income customers, as well as schools, libraries and rural health care facilities. Without the USF, communication costs would keep a significant percentage of citizens off-line.

Some of those Americans live in small villages scattered across the vast expanse of Alaska. In 2006, General Communications, Inc. (GCI), Alaska's leading integrated communications carrier, set out to create a level playing field for its customers, whether they live in the state's coastal cities or deep in the its rugged interior. It was a striking vision: a single high-capacity, IP-based network serving all of GCI's subscribers and capable of supporting the advanced data and video technology emerging from the laboratories of industry leaders like Ericsson and Nokia.

Given the geography of Alaska, the network had to be cellular rather than wireline, and the base stations would have to link via satellite. When it came to connecting the dots within an IP architecture, GCI concluded that only one company could engineer a solution: Globecomm.

Alaskan Challenge

"I think it's safe to say," says senior vice president of technology Stephen Yablonski, "that this project was significantly more challenging than anything else we have done in the last 20 years."

The challenge was the sum of the many parts that had to mesh to make the network a reality. To begin with: geography. GCI specified a 250-site network serving 200 rural villages. Many of these sites are accessible only for six months of the year due to freezing temperatures and heavy snowfall. Bringing electricity to them, and ensuring that the equipment could stay powered and warm in the event of an outage, were major issues. So was their location near the Arctic Circle. "Satellites in orbit over the equator have a tough time reaching so far north because of the curve of the earth," says Yablonski. "We're right at the limit of territory that can be served via satellite."

Executive Summary

For Alaska's leading carrier, Globecomm engineered an all-IP rural cellular network in one of the most challenging environments on Earth. Backhauled via satellite, the network uses a distributed switching architecture that keeps base stations online even through network outages.

Next: regulatory requirements. USF and FCC rules required the network to have E-911 capability. Simple enough in most places. But Alaska's extreme weather and northerly position practically guaranteed that the satellite link to the core switch would go down from time to time, taking E-911 offline and severing the connection to the home location registry (HLR) that could authenticate roaming subscribers.

Third: getting new technologies to work together. As an engineering-centric company, GCI was comfortable on the leading edge when it came to network elements. Globecomm won the business, in part, because it proposed as base station technology the Vanu Anywave® radio, which performs all signal processing in software rather than hardware. This allows system upgrades – from additional traffic channels to new wireless standards – to be made via software download instead of a site visit. That's no small matter when the base stations may be separated by hundreds of miles of frozen wilderness. Globecomm also proposed all-IP software-based switching from Star Solutions. These combined systems had to interface with GCI's Ericsson GSM switch in Anchorage. It was Globecomm's job, working with GCI, to mesh these different parts into a fully integrated network.

"I think this was the first time that Vanu and Star Solutions interfaced to each other and a traditional GSM core," says Gerard Johnston, senior director for the project. "Interoperability testing turned out to be a big part of the project."

Race Against the Weather

Globecomm was originally engaged just to engineer the IP "cloud" running over GCI's satellite network, so that all the elements of this distributed network would work in synch. But when the degree of difficulty became clear, GCI asked Globecomm to serve as prime contractor. Work began in the first quarter of 2007. By the end of that year, pilot sites were undergoing testing. In March of 2008, GCI began operating a pilot network, and Globecomm started up its ISO-9001 production line to manufacture the base station systems.

In addition to the engineering issues, the project faced a constant battle with the Alaskan terrain and climate. "One challenge was to package everything that so that GCI can offload it at their end onto a snowmobile, dog sled or seaplane," says project manager Doug Klein. "The outdoor equipment installation is scheduled to happen between May and September, because outside of that window, the weather conditions take a heavy toll on both equipment and GCI's installation crews." The base stations were engineered with temperature-controlled shelters, and the satellite antennas with de-icing equipment. An 8-hour battery backup protected each site from power outages.

High Survivability

Meeting the E-911 requirements led Globecomm and GCI to take a new approach to base station design. In addition to the Vanu radio, satellite antenna and accompanying gear, each base station was equipped with its own Star Solutions IP media gateway and HLR. The effect was to create a distributed switching system, in which each base station operates independently as well as interfacing with the core switch in Anchorage. If the satellite link goes down, local service continues, not only for those who make that area their home but also for roaming visitors. When the satellite link comes back up, the local media gateway restores long-distance service and re-synchs to the HLR at the core.

By April 2009, Globecomm had 35 sites up and running and GCI officially launched rural service. Until the full 250-site network is completed, Globecomm will provide remote monitoring from its Network Operations Center. This lets the company identify bottlenecks, track growth patterns and help GCI predict what licenses, software modifications and antenna upgrades may be needed in coming months. "Demand is exceeding GCI's original estimates," says Gerard Johnston. "In one of the larger sites, we originally engineered it to support 1,500 subscribers. By mid-2009, it already had more than 6,000 subs."

"We have enjoyed a real partnership with Globecomm from the beginning," says Dan Boyette, GCI's vice president for rural consumer services. "We did a lot of work on systems design and technology selection before we brought them into the job, but we depend on them to make this complex distributed switching architecture work. At the end of the day, GCI's reputation in rural Alaska will live or die based on the quality of the service we deliver over the network that Globecomm is putting into place."

Stephen Yablonski agrees. "The glue holding the network together is the IP engineering of the cloud. Getting voice and data to move efficiently through the network so that we don't waste satellite bandwidth, while our vendors are also uploading system updates to their individual equipment – well, that's what keeps it exciting."

And well worth it. "We heard about a villager who went out hunting on his snowmobile," says Doug Klein. "It broke down, the temperature was 30 degrees below zero and he was an hour's walk from town. But he was able to call a friend who brought him a replacement part on another snowmobile. It probably saved his life."

That's the bottom line for Globecomm Chairman and CEO David Hershberg. "We are seeing Universal Service Fund requirements springing up in countries around the world, because it makes such a difference in the lives of the average person. We're grateful to GCI for giving us the chance to work on a project of this size and importance." ■

A little bit of satellite goes a long way

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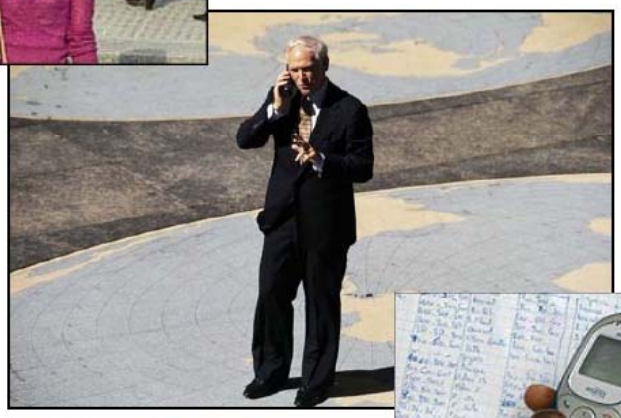
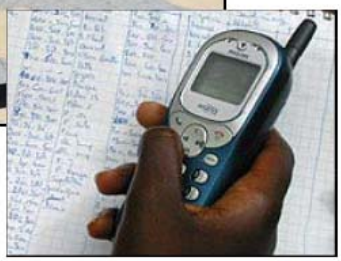
Appendix 2

Optimizing GSM Abis Extensions Via Satellite

A technology solution that permits dynamic sharing of satellite bandwidth among multiple Abis links, producing dramatic cost savings

May 12, 2006





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A little bit of satellite goes a long way®

VSAT for Abis Extension

For some time, mobile operators have used VSAT (very small aperture terminal) satellite links to deploy base stations in rural and low-density areas sometimes known as "telecom islands." Satellite links are used to extend the Abis interface that, in the GSM architecture, connects the Base Station Controller (BSC) to Base Transceiver Stations (BSTs). This allows the operator to avoid the cost of deploying multiple instances of major network elements in areas where there is a need to provide coverage but too little local subscriber revenue to justify significant investment.

The standard design for the Abis satellite link is a dedicated single-carrier per channel (SCPC) link, with each BST allocated a fixed amount of satellite bandwidth. This approach works, but makes inefficient use of transponder capacity, which is the most expensive part of the satellite circuit. Some efficiency gains have been achieved recently by converting transmission to IP protocol, but they fail to attack the central cause of inefficiency. A dedicated SCPC link to a BTS must be dimensioned to provide enough bandwidth to handle peak traffic, which inevitably results in unused bandwidth during period of lower traffic flow. The typical design dedicates one or more full E1 links to each BTS, with idle GSM time slots carried across the satellite link.

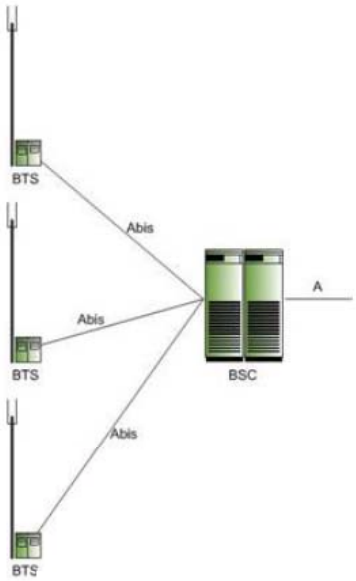
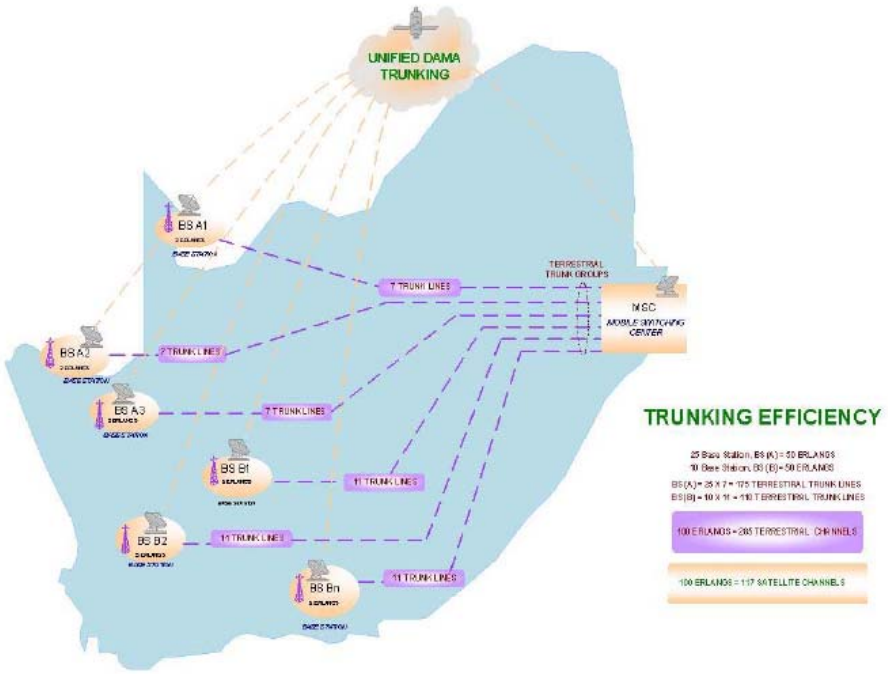


Diagram courtesy mpirical limited

Sharing the IP Stream

Globecomm has developed a powerful solution called SatCell® that optimizes the Abis stream for transmission over IP using best-of-breed technology from iDirect Technologies. Based on years of experience helping mobile operators with Abis extension over satellite, Globecomm has created a platform that drastically reduces transponder capacity needs by sharing a single IP stream between multiple Abis links. The SatCell solution exploits the strengths of iDirect's Demand Assigned Multiple Access (DAMA) Unified Trunking technology to assign access to the BSC instantly on demand. SatCell also suppresses idle GSM timeslots, rather than transmitting them over the satellite link, and allows base stations spread across a wide area to share a common pool of GSM

timeslots. This permits the GSM time slot to be used in the transport layer only, so that E1s are no longer dedicated to individual base stations.



This diagram shows a network that would normally require 35 terrestrial E1s to support six base transceiver stations. The satellite DAMA network, however, creates the equivalent capacity with only 100 GSM timeslots. If any BTS experiences peak traffic, it can instantly access up to a full E1 from the pool of timeslots.

SatCell achieves this high efficiency through mediation of the Abis streams to minimize bandwidth per time slot while maintaining QoS. Methods include:

- Protocol adaptation between the TDM BS and the IP-based iDirect network
- Elimination of idle packets
- Compression of signaling overhead

iDirect DAMA Architecture

In a typical configuration, the DAMA network employs a single outbound carrier operating at up to 9 Mbps and multiple demand-assigned inbound carriers operating at 256k, 512k and 1,025 Kbps to minimize remote terminal costs and totaling up to 4 Mbps of capacity.

Optimal network architecture depends on the varying traffic demands at the remote locations as well as long-distance traffic flows. For low-density, long-distance traffic, a star or mesh DAMA architecture is usually most efficient. High-density, long-distance traffic typically requires a DAMA overlay on an SCPC core using high-order modulation schemes such as BPSK, QPSK, 8PSK or 16QAM. The traffic correlation gains are highest for lower-traffic base stations.

Cost Savings

Globecomm's SatCell implementation of DAMA-based satellite Abis extension has produced remarkable cost savings compared with both standard SCPC satellite extension and terrestrial network extension. Using erlangs as a standard measure of traffic volume per hour and an average cost for satellite bandwidth of US$4,000 per Mhz per month, Globecomm has achieved the following bandwidth cost per erlang of traffic:

256 Kbps	512 Kbps	1,024 Kbps
$70	$65	$59

This compares with a typical terrestrial cost for serving the first erlang of traffic of US$1,000 per month.

About Globecomm

Globecomm integrates satellite into network applications in order to provide reliable, high-quality connection to the edge of the network, broadcast one-to-many, and support bandwidth-hungry applications. Globecomm is the only company in the industry that can, under one roof, design, install, integrate, support, manage and operate a customer's systems and networks, or provide turnkey services that offer the same features and functions as a customer-owned facility. Globecomm specializes in providing total solutions that free its

customers to focus on their core mission, whether it is telecommunications, broadcasting, retailing, serving constituents, maintaining security or projecting force. More information is available at www.globecommmsystems.com.

Appendix 3

CASE STUDY

Afghanistan's Communications Moves to the Next Generation with Help From Globecomm

Through the ages, the region now called Afghanistan has been at the crossroads of empire. Its people and territory have faced conquest by the Greeks, Arabs, Mongols, Turks, British, Soviets and, following the September 11 attack on New York's World Trade Center, the United States. This turbulent history, the rule of the Taliban and six years of civil war have left Afghanistan a legacy of widespread poverty, decimated infrastructure, and possibly the largest concentration of land mines on earth. Few nations in the 21st Century face the challenges that confront the nation's first democratically elected government today.

Communications has been essential to governing since the days when news traveled no faster than a horse could ride. Recognizing its importance, the World Bank issued a request for proposal in 2003 to construct a Government Communications Network (GCN) for Afghanistan's Ministry of Communications. It aimed to provide voice and data services to ministries and government offices in Kabul, Afghanistan's capital, and to provincial capitals.

The winning bidder was Globecomm. But there may have been days when company executives wondered if winning the bid was such a great idea.

Executive Summary

To support the new democratically elected government of Afghanistan, Globecomm designed, installed and operated IP-based, hybrid fiber-satellite networks linking government ministries, provincial capitals, army bases and radio and television facilities. The company met the challenging conditions of the country with the help of Afghan partners and by training Afghanis in satellite technology. In addition to operating private networks for national and local government, Globecomm used satellite backhaul and hosted switching to provide the backbone for a public mobile telephone system. ■

Changing Requirements

"The environment is about as challenging as it gets," says Globecomm vice president Paul Knudson, who manages Afghan projects for the company. "Outside Kabul, there is little or no infrastructure, no roads and no electricity. Security is a continuing concern. We have had to unload trucks in the middle of nowhere, hand-carry electronics across a stream, then get the truck across and reload it."

To make matter more complicated, no sooner had the project been awarded than it began to change. Globecomm discovered that the Ministry of Communications had, under a separate contract, purchased CDMA mobile switches from a Chinese company. They were providing local mobile service in "telecom islands" but had no outside connections. Interconnecting the switches and linking them to long-distance circuits became an unexpected priority.

"It was a fundamental change," says Globecomm vice president Paul Johnson, who is the account executive for Afghanistan. "What we originally planned to be a private network rapidly became a public network. We are, in effect, the backbone for a public telephone system, providing bandwidth, trunking, bringing traffic back to Kabul and providing international voice, video and Internet service. That's in addition to meeting the government's urgent need for connectivity."

Another important change involved the identity of Globecomm's client. Globecomm develops each project under the management of the Minis-

try of Communications. But when the Ministry accepts systems upon completion, the assets are transferred to Afghan Telecom. "The goal is to make the Ministry a true regulatory body," says Paul Knudson, "while Afghan Tel becomes the operator. With each new network, Afghan Tel gains assets and increased value that improve its ability to attract outside investment."

Multiple Projects

The IP-based Government Communications Network links 42 ministries and offices in Kabul via fiber and microwave, and extends this core network to 34 provincial capitals via satellite. Satellite bandwidth also links dozens of CDMA mobile switches in the provinces with Globecomm's SatCell hosted switching system in the United States. All calls taking place within the footprint of each CDMA switch remain local, while calls between the switches or outside Afghanistan are routed through Globecomm's Network Operations Center.

The GCN turned out to be the first of multiple projects awarded to Globecomm by Afghanistan's government. Next came the District Communications Network (DCN), funded by US AID, which aimed to push service into rural areas. Globecomm designed, installed and commissioned a satellite network connecting a hub in Kabul to police, fire and other essential services in each of Afghanistan's 337 legislative districts to provide voice and thin-route data as well as Internet access. Demand for the DCN has been tremendous, and Globecomm is working with Afghan Tel to expand the business plan and bring more revenue into the network.

IP-Based Platforms

An international gateway for voice, data and video, funded by the Afghan Reconstruction Trust Fund (ARTF), came next. The Ministry originally specified a DCME network, the standard technology, but accepted Globecomm's recommendation for an IP platform that was both less expensive and far more flexible. In addition to gateway service for Afghanistan, the ARFT also provides a backup satellite facility for the GCN.

In two other projects, Globecomm has installed PABX switches at National Army bases throughout the country and integrated them into an existing VSAT network, and also provided a custom-designed satellite truck to the Ministry for mobile spectrum monitoring. With so much of the nation's telecommunications depending on satellite, the truck will allow the Ministry to more effectively regulate spectrum, issue licenses and shut down illegal operators.

Paul Johnson gives much of the credit for Globecomm's in-country success to its Afghan partner, Watan Telecom, and its Chairman and CEO, Mr. Rateb Popal. "Mr. Popal worked with us early on to ensure that resources were in place to train the people needed to carry out the installation and commissioning of the work. Together, we have built the capacity of the Afghan workers and transferred a great deal of technology 'know how.' We now have Afghan technicians supporting the programs as they move from deployment to operations and maintenance. I have been really impressed by their desire to learn and their level of commitment."

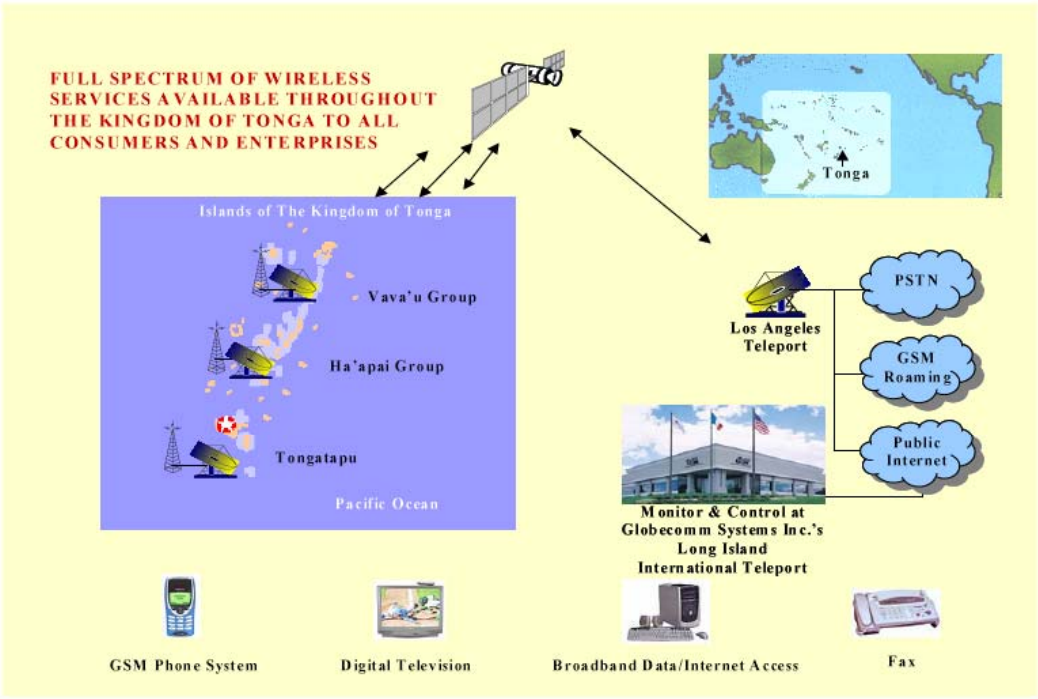
"The people of Afghanistan are thirsting for improvement in the quality of their lives," says David Hershberg, Chairman and CEO of Globecomm. "Our work is helping to meet that need. You can't possibly build an effective government without reliable communications. We're helping newly-elected legislators and cabinet members understand what it takes to legislate and govern. Our network provides videoconferencing among provincial officials so they can learn from each other and work together. Communications creates opportunities for commerce, to obtain finance and credit, to interact with NGOs and with the government. We're incredibly proud to be making this contribution, and endlessly impressed with the determination of our employees, partners and customers in Afghanistan." ■

Appendix 4

Next-Generation Network For the Island of Tonga

A new communications service provider needed a multi-service IP network to provide 21st century voice, data and entertainment services to subscribers through-out he Kingdom of Tonga.

Globecomm designed and continues to implement an IP-based telecommunications network that integrates satellite, terrestrial microwave, GSM cellular, fixed wireless, and digital television broadcast technologies. The network provides high-speed Internet access to consumers as well as corporate/government entities, private data services, GSM telephone services, and video and audio entertainment services on a subscription basis. In addition to establishing the telecommunications infra-structure and Internet connections, we are also providing the connection to the international public switched telephone network (PSTN). Globecomm handles the billing and subscriber management systems for all services, while providing ongoing network operations and maintenance support.



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